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Los Alamos NATIONAL LABORATORY EST.1943

Environmental Stewardship — Remediation Services
Environmental Characterization and Remediation

Standard Operating Procedure

for Drilling Plan Development

Revision Log

Revision No.	Effective Date	Prepared By	Description of Revisions	Affected Pages
R0	3/16/92	Sandra Wagner	New Procedure	All
R1	9/28/95	Linda Fluk	Revised to meet current methods used	All
R2	04/21/99	Joe Skalski, Bob Gilkeson	Revised to meet current SOP template, and drilling process requirements	All
R3	02/16/05	Andrew E. Gallegos	Revised to meet current SOP template and to address requirements of the NMED Compliance Order.	All

Drilling Plan Devleopment

Table of Contents

List of Acronyms and Abbreviations

ASTM	American Society for Testing and Materials
ECR	Environmental Characterization and Remediation
EDS	employee development system
ENV	Environmental Services
DOE	Department of Energy
DSA	Documented Safety Analysis
DWP	Drilling Work Plan
LANL	Los Alamos National Laboratory
IWP	Investigation Work Plan
NES	Nuclear Environment Site
QII	Quality Improvement and Integration Team
QMP	quality management plan
QP	quality procedure
RPF	Records Processing Facility
RS	Remediation Services

SSHASP	site specific health and safety plan
SMP	Safety Management Plan
SOP	standard operating procedure
SOW	statement of work
TSR	Technical Safety Requirements
USQ	Unreviewed safety question
UTR	University of California technical representative

Drilling Plan Devleopment

1.0 PURPOSE

This standard operating procedure states the responsibilities and describes the process for development of drilling plans to meet subsurface sampling requirements as required by the New Mexico Environmental Department Consent Order or radioactive contaminated sites regulated by the Department of Energy (DOE).

2.0 SCOPE

All **participants** shall implement this mandatory procedure when developing and managing drilling processes for the Los Alamos National Laboratory (LANL or the Laboratory) Environmental Stewardship (ENV) Division Remediation Services (RS), Environmental Characterization and Remediation (ECR) Group.

3.0 TRAINING

3.1 **Participants** shall train to (e.g., by reading and/or classroom training) and use the current version of this procedure; contact the author of this procedure if the text is unclear.

3.2 **RS/ECR participants** shall document training to this procedure in accordance with QP-2.2, “Personnel Training Management Process,” using the training documentation link below, if possess a CRYPTOCard and administrative authority to the Laboratory, employee development system (EDS), or using hardcopy forms located at http://erinternal.lanl.gov/home_links/Library_proc.shtml.

3.3 The responsible **project leader** shall monitor the proper implementation of this procedure.

3.4 The responsible **team leader** shall ensure that the appropriate personnel complete all applicable training assignments.

3.5 **Participants** may request any needed assistance with implementation of this procedure from the ECR Quality Integration and Improvement (QII) team.

4.0 DEFINITIONS

4.1 *CRYPTOCard* — A CRYPTOCard is a credit-card-sized computer that generates "one-time" passwords or "passcodes." Like a desktop computer, it has a keypad for input, a display window for output, memory, and a microprocessor.

4.2 *Documented Safety Analysis*— A documented analysis of the extent to which a nuclear facility can be operated safely with respect to workers, the public, and the environment, including a description of the conditions, safe boundaries, and hazard controls that provide the basis for ensuring safety.

4.3 *Drilling Plan* — A document addressing requirements and management processes used for well and borehole construction and/or abandonment.

4.4 *Employee development system (EDS)* — The Laboratory's official training records database that maintains and archives vital training records. EDS attributes include, but are not limited to, a training program catalog, registration, and enrollment functions, class lists, course cost information, historical information of LANL worker training records, transcripts of completed training for LANL workers, individual training plans, and training reports.

4.5 *Facility* — An area, physical structure or combination of structures together with the associated support infrastructure that form the envelope in which work is accomplished.

4.6 *Investigation work plan* — (formerly known as a Sample Analysis Plan), a document containing data quality objective and analytical sampling requirements and sampling method descriptions.

4.7 *Quality specialist* — Member of the ECR QII team who provides assistance with implementation of the quality management system.

4.8 *Nuclear Environmental Site (NES)* —Inactive waste handling or disposal areas that have been characterized as nuclear sites because, based on an initial categorization, their inventory identified them as hazard category 2 or 3 according to DOE-STD-1027 threshold.

4.9 *Nuclear Facility* — A reactor or a nonreactor nuclear facility where an activity is conducted for or on behalf of the Department of Energy (DOE) and includes any related area, structure, facility, or activity to the extent necessary to ensure proper implementation of the requirements contained in 10 CFR 83.0, Nuclear Safety Management.

4.10 *Participant* — An inclusive term for any University of California/staff augmentation employee, deployed worker, or subcontractor, inclusive of project leaders, team leaders, and project personnel, who participates in activities conducted by or on behalf of the ECR Group.

4.11 *Project leader* — A University of California employee or deployed worker directly responsible for the management of one or more projects.

4.11 *Readiness Review* — A process to ensure the closure of preparatory activities required before starting fieldwork and to ensure that the

preparatory activities not required to start fieldwork are scheduled and closed appropriately.

4.12 *Record* — Per Title 44, Chapter 33, Section 3301 of the US Code, All books, papers, maps, photographs, machine-readable materials, or other documentary materials, regardless of physical form or characteristics, made or received by an agency of the United States Government under Federal law or in connection with the transaction of public business and preserved or appropriate for preservation by that agency as evidence of the organization, functions, policies, decisions, procedures, operations, or other activities or because of the informational value of data in them."

4.13 Safety Management Program — are the Unreviewed Safety Question (USQ) Process, Nuclear Criticality Program, Radiation Protection Program, Quality Assurance Program, Abnormal Event Reporting Program, Qualification and Training Program, Record-keeping Program, Vehicle and Equipment Maintenance Program, Emergency Management Program, Fire Protection Program, Calibration Program, Hazardous Materials Protection Program, and Radioactive and Hazardous Waste Management Program.

4.14 Site-specific health and safety plan (SSHASP) — Health and safety plan that is specific to a site or ENV-RS/ECR-related field activity that has been approved by an ENV-ECR health and safety representative. This document contains information specific to the project including scope of work, relevant history, descriptions of hazards by activity associated with the project site(s), and techniques for exposure mitigation (e.g., personal protective equipment [PPE]) and hazard mitigation.

4.15 *Standard operating procedure (SOP)* — A document within ENV-ECR that describes work processes governed by the "Quality Management Plan (QMP)."

4.16 Subcontractor — A person employed by an external company tasked to perform work under a contract or task order.

4.17 *Team leader* — Any University of California employee who manages one or more functions of the ECR Group and who directly supervises project leaders.

4.18 *Technical activity* — Any activity related to observing, identifying, describing, studying, analyzing, explaining, or obtaining information and/or data for technical purposes (e.g., site investigation, characterization, or remediation).

4.19 *Technical Safety Requirements (TSR)* — The limits, controls, and related actions that establish the specific parameters and requisite actions for the safe operation of a nuclear facility and include the following items as

appropriate for the work and the hazards identified in the documented safety analysis for the facility: Safety limits, operating limits, surveillance requirements, administrative and managerial controls, use and application provisions, and design features, as well as bases.

4.20 *Unreviewed Safety Question (USQ)* — A situation where:

- The probability of the occurrence, or the consequences of an accident, or the malfunction of equipment important to safety previously evaluated in the documented safety analysis could be increased;
- The possibility of an accident or malfunction of a different type than any evaluated previously in the documented safety analysis could be created;
- A margin of safety could be reduced; or
- The documented safety analysis may not be bounding or may be otherwise inadequate.

5.0 RESPONSIBLE PERSONNEL

The following identifies the personnel responsible for actions in this procedure:

- participants
- project leader
- subcontractor
- team leader

6.0 BACKGROUND AND PRECAUTIONS

6.1 Use this procedure in conjunction with an approved Site-Specific Health and Safety Plan.

6.2 An Integrated Work Document shall be prepared, approved and implemented in accordance with LANL IMP 300-00-00, Integrated Work Management for Work Activities.

6.3 Refer to the applicable statement of work, the State of New Mexico Environmental Department Compliance Order, Chapter IX.B, Investigation, Sampling, and Analysis Methods and Chapter X, Monitoring Well Construction Requirements and/or the American Society for Testing and Materials (ASTM) Standards identified in Section 11.0 for all applicable drilling process requirements.

7.0 EQUIPMENT

7.1 The responsible **project leader** shall ensure an equipment and supply checklist is prepared, if applicable, for use during implementation of this procedure.

7.2 **Participants** shall use only the equipment and supplies authorized by the responsible project leader.

7.3 **Participants** shall report to the project leader any equipment or supply item listed on the checklist that is not available for use and the need for equipment or supply items in addition to or different from the equipment and supplies listed on the checklist.

8.0 PROCEDURE

8.1 Develop a Drilling Plan

The responsible **project leader** shall ensure implementation of the following:

8.1.1 Prepare a Drilling Plan (See Attachment A for non-nuclear and Attachment B for NES 8.) that includes monitoring well construction requirements and Investigation, Sampling and Analysis methods addressed in the New Mexico Environmental Department (NMED)/Los Alamos National Laboratory (LANL) Consent Order and the applicable ASTM Standards listed in Section 11.0.

8.1.2 If environmental drilling occurs upon or impacts a Nuclear Environment Site (NES) ensure the drilling plan address all Safety Program Management Plans (SMP), Technical Safety Requirements (TSA), and other requirements contained in the Documented Safety Analysis (DSA). An outline guidance for the Drilling Work Plan for NES is provided in Attachment B.

8.1.3 The Drilling Plan is developed in accordance with this SOP and is submitted for review and approval in accordance with QP-4.9, Document Development and Approval Process; Peer Review Required.

8.1.4 Address requirements for the use of an Open Flame Permit, and equipment maintenance and repairs on site.

8.1.5 Review and approval of the Drilling Plan by the following participants:

- ENV-ECR Group Leader
- Project Leader;

- Quality Specialist
- NWIS Responsible Division Leader (for NES only)

8.1.6 Drilling Plans are controlled in accordance with QP-4.5, Document Control.

8.1.7 If down hole geophysical logging is required, develop a section within the Drilling Plan to address the applicable requirements and processes.

8.1.8 An approved Investigation Work Plan (formerly known as a Sample Analysis Plan) has been developed, reviewed and approved.

8.2 Perform Pre-operation Drilling Activities

The responsible **project leader** shall ensure implementation of the following:

8.2.1 Implement SOP-01.01, General Instructions for Field Investigations.

8.2.2 All participants are aware they are to implement SOP-01.01, General Instructions for Field Investigations when addressing deviations from procedural requirements.

8.2.3 The drilling subcontractor has been qualified in accordnace with QP-7.2, Supplier Evaluation.

8.2.4 All participants have performed and documented the reviewed of the Drilling Plan, Investigation Work Plan, IWD and SSHASP, as applicable.

8.2.5 Perform, document and verify pre-drilling location and setup.

Caution: This action is specifically required at all NES location per DSA requirements.

8.2.6 Complete all necessary work-site preparations (e.g., removing brush and minor obstructions, clearing access roads, properly staking the borehole location and locating utility transmission lines).

8.2.7 Schedule, perform and document an inspection including the verification of decontamination process implementation of the drilling rig and associated equipment (e.g., augers, bits, cables etc.) with the Subcontractor and/or HSR-5 before mobilizing to the drill site.

8.3 Mobilize Drilling Rig and Participants to the Drilling Site

The responsible **team leader** shall ensure implementation of the following:

8.3.1 Mobilize the drilling rig and associated equipment after successful completion of action step 8.2.7.

8.3.2 Mobilize all qualified participants to the drilling site.

Note: Refer to Section 3.0, Training for specific requirements.

8.4 Perform Drilling Operation

The responsible **project leader** shall ensure implementation of the following:

8.4.1 All drilling operations are carried out as specified in the Drilling Plan unless otherwise directed in writing by the ENV-ECR Group Leader and/or program leader.

8.4.2 Modification of well and/or borehole construction is performed in accordance with the Drilling Plan and applicable design procedures.

8.4.3 Implementation of SOP-06.26, Core Barrel Sampling for Subsurface Earth Materials if coring is specified.

8.4.4 All samples are taken and processed as specified in the Investigation Work Plan.

8.4.5 Borehole materials are processed in accordance with SOP-12.01, Field Logging, Handling, and Documentation of Borehole Materials and SOP-12.02, Transportation, Receipt, and Admittance or Borehole Samples for the Sample Management Facility.

8.4.6 Submit records, as specified in the applicable SOPs and QPs.

8.4.7 Monitor the collection and storage of all excess cuttings, waste materials, and decontamination solutions for proper disposal as described in SOP-1.06, Management of Environmental Restoration Project Wastes.

8.5 Perform Post-operation Activities

The responsible **project leader** shall ensure implementation of the following:

8.5.1 All drill-site equipment is accounted for, decontaminated, and ready for shipment to the next site.

8.5.2 All borehole locations are properly marked and recorded and the location identification is readily visible on the location stake.

8.5.3 The well and/or borehole identification and survey location is recorded on the protective casing.

Note: Refer to the Drilling Plan for specific details for recording this information.

8.5.4 Restore the site to pre-drilling conditions as specified in the Drilling Plan.

8.5.5 Well construction and/or borehole abandonment information is developed and submitted in accordance with QP-6.3, Design Review.

9.0 LESSONS LEARNED

9.1 Before performing work processes prescribed in this procedure, **participants** should access the Department of Energy Lessons Learned Information Services Web site, http://www.tis.eh.doe.gov/ll/ll.html, and Laboratory Lessons Learned Resources Web site, http://www.lanl.gov/projects/lessons_learned/, and search for applicable lessons learned.

9.2 **Participants** should submit any lesson learned related to work prescribed in this procedure to the Laboratory Lessons Learned Resources Web site, http://www.lanl.gov/projects/lessons_learned/.

10.0 RECORDS

The **Project Leader** shall submit the following records to the Records Processing Facility, in accordance with QP-4.4, “Record Transmittal to the Records Processing Facility”:

- Completed Daily Activity Log forms (Attachment E in SOP-1.04)
- Completed Records from SOP-12.01 (Attachments A–J, as necessary)
- Completed Records from SOP-12.02 (Attachments A–C, as necessary)
- Completed Monitoring and Borehole Abandonment Information
- Design Documents (e.g., redline drawings, design field changes, well construction diagrams and as-built drawings, and borehole as-built drawings etc.)
- Approved Drilling Plan

11.0 REFERENCES

To implement properly this procedure, **participants** should become familiar with the contents of the following documents, available at http://erinternal.lanl.gov/home_links/Library_proc.shtml:

- “Quality Management Plan”
- QP-2.1, “Documenting Personnel Qualification and Selection Process”
- QP-2.2, “Personnel Training Management Process”
- QP-4.2, “Standard Operating Procedure Development”
- QP-4.4, “Record Transmittal to the Records Processing Facility”
- QP-4.9, “Document Development and Approval Process: Peer Review Required”
- QP-5.7, ”Notebook Documentaiton for Environmental Rstoration Technical Activities”
- QP-6.3, “Design Review”
- QP-6.4, “Preparation of Envrionmental Restoration Design Drawings”
- QP-6.8, “Design Field Change”
- QP-7.2, “Procurement”
- SOP-01.01, “General Instructions for Field Investigations”
- SOP-1.04, “Sample Control and Field Documentation”
- SOP-1.06, “Management of Environmental Restoration Project Wastes”
- SOP-1.08, “Field Decontamination of Drilling and Sampling Equipment”
- SOP-06.26, “Core Barrel Sampling for Subsurface Earth Materials”
- SOP-12.01, “Field Logging, Handling, and Documentation of Borehole Materials”
- SOP-12.02, “Transportation, Receipt, and Admittance or Borehole Samples for the Sample Management Facility”
- LANL IMP 300-00-00, “Integrated Work Management for Work Activities, located at: http://labreq.lanl.gov/
- State of New Mexico Environmental Department Compliance Order, Chapter IX.B, Investigation, Sampling, and Analysis Methods and Chapter X, Monitoring Well Construction Requirements.

Note: Contact the responsible project leader for a copy of these chapters.

ASTM documents are available at http://www.astm.org/cgi-bin/SoftCart.exe/index.shtml?E+mystore

- ASTM D 1586-99, Standard Guide for Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils
- ASTM D 1587-00, Standard Practice for Thin-Walled Tube Sampling of Soils for Getechnical Purposes

- ASTM D 3550-01, Standard Practice for Thick Wall Ring-Lined, Split Barrel Drive Sampling of Soils
- ASTM D 5092-90, Standard Practice for Design and Installation of Ground Water Monitoring Wells in Aquifers
- ASTM D 5753-95, Standard Guide for Planning and Conducting Borehole Geophysical Logging
- ASTM D 5782-95, Standard Guide for Use of Direct Air-Rotary Drilling for Geoenvironmental Exploration and the Installation of Subsurface Water-Quality Monitoring Devices
- ASTM D 5783-95, Standard Guide for Use of Direct Rotary Drilling with Water-Based Drilling Fluid for Geoenvironmental Exploration and the Installation of Subsurface Water-Quality Monitoring Devices
- ASTM D 5784-95, Standard Guide for Use of Hollow-Stem Augers for Geoenvironmental Exploration and the Installation of Subsurface Water-Quality Monitoring Devices
- ASTM D 5787-95, Standard Guide for Monitoring Well Protection
- ASTM D 5872-95, Standard Guide for Use of Casing Advancement Drilling Methods for Geoenvironmental Exploration and Installation of Subsurface Water-Quality Monitoring Devices
- ASTM D 5875-95, Standard Guide for Use of Cable-Tool Drilling and Sampling Methods for Geoenvironmental Exploration and Installation of Subsurface Water-Quality Monitoring Devices
- ASTM D 5876-95, Standard Guide for Use of Direct Rotary Wireline Casing Advancement Drilling Methiods for Geenvironmental Exploration and Installation of Subsurface Water-Quality Monitoring Devices
- ASTM D 6089-97, Standard Guide for Documenting a Ground-Water Sampling Event
- ASTM D 6167-97, Standard Guide for Conducting Borehole Geophysical Logging: Mechanical Caliper
- ASTM D 6169-98, Standard Guide for Selection of Soil and Rock Sampling Devices Used With Drill Rigs for Environmental Investigations
- ASTM D 6232-03, Standard Guide for Selection of Sampling Equipment for Waste and Contaminated Media Data Collection Activities
- ASTM D 6286-98, Standard Guide for Selection of Drilling Methods for Environmental Site Characterization
- ASTM D 6914-04, Standard Practice for Sonic Drilling for Site Characterization and the Installation of Subsurface Monitoring Devices

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12.0 ATTACHMENTS

Participants may locate all example forms associated with this procedure at http://erinternal.lanl.gov/Quality/user/forms.asp.

Attachment A: Non-Nuclear Drilling Plan Outline (2 pages)

Attachment B: NES Drilling Plan Outline (2 pages)

Using a "CRYPTOCard," click here to record "self-study" training to this procedure.
If you do not possess a "CRYPTOCard" or encounter problems, contact the ENV-ECR training specialist.

Non-Nuclear Drilling Plan Outline

Table of Contents

11.0 References

NES Drilling Plan Outline

Table of Contents

12.0 Introduction

13.0 Purpose

14.0 Site Descriptions
- 14.1 TA-XX, system title (e.g., Waste Water Treatment Plant)
- 14.2 Location (e.g., Pratt Canyon)

15.0 Design Requirements

16.0 Sampling Requirements (to include down hole geophysical)

17.0 Operations
- 17.1 Pre-Drilling Tasks
- 17.2 Post-Drilling Tasks

18.0 Safety Management Programs
- 18.1 SMP 1 – Integrated Work Management (IWM) Program
- 18.2 SMP 2 – Unreviewed Safety Question (USQ) Program
- 18.3 SMP 3 – Nuclear Criticality Program
- 18.4 SMP 4 – Radiation Protection Program
- 18.5 SMP 5 – Quality Assurance Program
- 18.6 SMP 6 – Abnormal Event Reporting Program
- 18.7 SMP 7 – Qualification and Training Program
- 18.8 SMP 8 – Record Keeping Program
- 18.9 SMP 9 – Configuration Management Program
- 18.10 SMP 10 – Vehicle and Equipment Maintenance
- 18.11 SMP 11 – Emergency Preparedness
- 18.12 SMP 12 – Fire Protection
- 18.13 SMP 13 – Calibration Program
- 18.14 SMP 14 – Hazardous-Materials Protection Program
- 18.15 SMP 15 – Radioactive and Hazardous Waste Management Program

19.0 Technical Safety Requirements; Drilling Controls
- 19.1 TSR 1
- 19.2 TSR 2
- 19.3 TSR 3
- 19.4 TSR 4
- 19.5 TSR 5
  - 19.5.1 Pre-drilling Location Evaluation
  - 19.5.2 Location Evaluation During Angle Drilling
  - 19.5.3 Monitoring and Measurements of Work Environment and Vicinity During Drilling
  - 19.5.4 Evaluating Exhumed Material and Prevention and Contamination

19.5.5 Control the Rate of Material Removal
19.5.6 Dust Control
19.5.7 Equipment maintenance and repairs including the need for open flame permits

19.6 TSR 6
19.7 TSR 7
19.8 TSR 8

20.0 Conduct of Operations

21.0 Other Requirements

10.1 Miscellaneous Nuclear Environmental Site Surveillance and Maintenance Requirements

22.0 References